Pathways 19.3.3/4/5/7 by YAS and the second period (2 June 2020 (10:30 hours) to 29 June 2020) Pathways 19.3.8/9 which incorporated loss of taste or smell as a feature of COVID-19 infection (online supplemental material 4).

Patient characteristics of false negatives (those advised to self-care/non-urgent assessment who experienced the primary outcome) and true positives (those provided with an ambulance/urgent assessment who experienced the primary outcome) were compared. Similarly, we compared the characteristics of false positives (those provided with an ambulance/urgent assessment and not conveyed to hospital and did not experience the primary outcome) and true negatives (those advised to self-care/non-urgent assessment) among those who did not experience the primary composite adverse outcome. In patients with the adverse outcome, multivariable logistic regression was used to identify patient characteristics associated with false negative triage. We completed equivalent analysis in those without the adverse outcome to identify factors which predicted false positive triage. The models included: age, gender, available comorbidities, smoking status, number of medications, deprivation index and number of contacts with telephone triage. Due to a low proportion of missing data in included variables, complete case analysis was conducted. As with the previous analysis, ethnicity and obesity were excluded. Frailty was additionally excluded from this modelling due to a high proportion of missing data (39.4% of false negatives).

The sample size was based on the number of NHS 111 calls for suspected COVID-19 that YAS received during the first wave of the pandemic. All multivariable logistic models included a sample size of >500 and >10 events (adverse clinical outcome, false positive or false negative triage) per predictor parameter.[22 23] All totals presented are rounded to the nearest 5, with small numbers suppressed to comply with NHS Digital data disclosure guidance.

Patient and public involvement

The Sheffield Emergency Care Forum (SECF) is a public representative group interested in emergency care research.[24] Members of SECF advised on the development of the PRIEST study and two members joined the Study Steering Committee. A PRIEST study patient public involvement (PPI) group was created during the study which included patients who had been admitted to hospital with COVID-19 or their family members. Although not involved in conducting the analyses, both PPI groups were consulted regarding study design, particularly the ethical implications of using routine health data for research. All study findings were presented and discussed with the PPI groups. Members helped with interpretation of findings particularly regarding acceptable risk of misclassification.

RESULTS

Study population

Figure 1 and table 1 summarise study cohort derivation and the characteristics of the 40 261 included individuals. In total, 1200 people (3%, 95% CI: 2.8% to 3.2%) experienced the primary outcome (death or organ support) within 30 days following first contact with telephone triage services and 670 (56%) of adverse outcomes occurred within 7 days of contact. In our study cohort, 8165 patients (20.3%, 95% CI: 19.9% to 20.7%) were conveyed or self-presented to the ED and 4490 (11.2%, 95% CI: 10.9% to 11.5%) were admitted as hospital inpatients within 30 days of index contact.

The median age of the whole cohort was 47 years, the cohort had a higher proportion of females (56.4%) than males and had high rates of comorbidity (chronic respiratory disease 25.6%, diabetes 10.5% and hypertension 18.1%). In multivariable modelling (online supplemental material 5), known predictors of adverse outcomes including increasing age (1-year increase, OR 1.06, 95% CI: 1.06 to 1.07), male gender (female, OR 0.48, 95% CI: 0.40 to 0.58), diabetes (OR 1.62, 95% CI: 1.26 to 2.09) and frailty (moderate, OR 1.07, 95% CI: 0.71 to 1.07: severe, OR 2.51, 95% CI: 1.74 to 3.61) were associated with an increased risk of the primary composite adverse outcome.

Accuracy of NHS 111 triage

A triage disposition of ambulance dispatch/urgent clinical assessment achieved a sensitivity of 74.2% (95% CI: 71.6% to 76.6%) to the primary outcome across the whole study period (table 2). If advised to self-care/non-urgent clinical assessment, the chance of experiencing an adverse outcome was approximately 1% (NPV: 98.7%, 95% CI: 98.6% to 98.9%). For patients who contacted NHS 111 multiple times, classification of the triage disposition on the basis of the last call before the primary outcome, instead of index contact, did not noticeably affect these estimates (sensitivity: 77.3%, 95% CI: 74.8% to 79.6% and (NPV: 98.9%, 95% CI: 98.7% to 99%).

Sensitivity of triage disposition was higher for adverse outcomes at 3 days from index contact (81.4%, 95% CI: 76.6% to 85.5%) (online supplemental material 6), than at 7 and 30 days. Specificity was comparable for adverse outcomes at 30 days (61.5%, 95% CI: 61% to 62%) and 3 days (60.8%, 95% CI: 60.2% to 61.3%). In the later period of NHS 111 clinical assessment pathway implementation, sensitivity to adverse outcomes at 30 days increased (85.7%, 95% CI: 76.9% to 91.7%) but this was associated with a reduction in specificity (51.5%, 95% CI: 50% to 53.1%) (table 2).

Prediction of false negative or false positive triage

Online supplemental material 7 compares the characteristics of who were correctly triaged as true positives or misclassified as false negatives. In both groups, approximately 50% of people experienced the primary adverse